

## **RAW SEQUENCE LISTING**

**The Biotechnology Systems Branch of the Scientific and Technical  
Information Center (STIC) no errors detected.**

Application Serial Number: 10/521,138

Source: PG

Date Processed by STIC: 4/14/06

# ***ENTERED***



PCT

## RAW SEQUENCE LISTING

DATE: 04/14/2006

PATENT APPLICATION: US/10/521,138

TIME: 11:20:54

Input Set : A:\-159-2.APP

Output Set: N:\CRF4\04142006\J521138.raw

```

3 <110> APPLICANT: Johnson, Karl F.
4   Bezila, Daniel James
5   Taylor, Diane E.
6   Simala-Grant, Joanne
7   Rasko, David
8   Neose Technologies, Inc.
9   Governors of the University of Alberta
11 <120> TITLE OF INVENTION: Synthesis of Oligosaccharides, Glycolipids and
12   Glycoproteins Using Bacterial Glycosyltransferases
14 <130> FILE REFERENCE: 019957-015920US
C--> 16 <140> CURRENT APPLICATION NUMBER: US/10/521,138
C--> 17 <141> CURRENT FILING DATE: 2005-01-12
19 <150> PRIOR APPLICATION NUMBER: US 60/398,156
20 <151> PRIOR FILING DATE: 2002-07-23
22 <150> PRIOR APPLICATION NUMBER: US 60/424,894
23 <151> PRIOR FILING DATE: 2002-11-08
25 <150> PRIOR APPLICATION NUMBER: WO PCT/US03/23057
26 <151> PRIOR FILING DATE: 2003-07-23
28 <150> PRIOR APPLICATION NUMBER: WO PCT/US03/23155
29 <151> PRIOR FILING DATE: 2003-07-23
31 <160> NUMBER OF SEQ ID NOS: 76
33 <170> SOFTWARE: PatentIn Ver. 2.1
35 <210> SEQ ID NO: 1
36 <211> LENGTH: 1461
37 <212> TYPE: DNA
38 <213> ORGANISM: Helicobacter pylori
40 <220> FEATURE:
41 <223> OTHER INFORMATION: Helicobacter pylori strain 1182 FutB
42   alpha-1,3/4-fucosyltransferase
44 <400> SEQUENCE: 1
45 atgttccaac ccctattaga cgcttatata gaaagcgctt ccattgaaaa aattacctct 60
46 aaatctcccc cccccctaaa aatcgctgtg gcgaattggg ggggagatga agagggtgaa 120
47 gaatttaaaa agaacattct ttattttatt ctcaagtcagc attacacaat caccctccac 180
48 caaaacccca acgaaccctc cgatctcgtc tttggcagtc ctattggatc agccagaaaa 240
49 atctttatcct atcaaaacgc aaaaagagtg ttttacaccg gtgaaaacga atcgccctaat 300
50 ttcaacctct ttgattacgc cataggcttt gatgaattgg attttagaga tcgttattta 360
51 agaatgcctt tatattatga tagactacac cataaagccg agagcgtgaa tgacaccact 420
52 tcgccttaca aactcaaacc tgacagcctt tatgctttta aaaaaccctc ccatcatattt 480
53 aaagaaaacc accccaattt atgcgcagta gtgaacaatg agagcgatcc tttgaaaaga 540
54 ggggtttgcga gttttgtagc gagcaaccct aacgctccta aaaggaatgc tttctatgac 600
55 gtttttaaatt ctatagagcc agttattggg ggaggggagc tgaaaaacac tttaggctat 660
56 aacattaaaa acaagagcga gtttttaagc caatacaaat tcaatctgtg ttttgaaaac 720
57 tcacaaggct atggctatgt aactgaaaaa atcattgacg cttacttttag ccataaccatt 780

```

## RAW SEQUENCE LISTING

DATE: 04/14/2006

PATENT APPLICATION: US/10/521,138

TIME: 11:20:54

Input Set : A:\-159-2.APP

Output Set: N:\CRF4\04142006\J521138.raw

```

58 cctattttatt ggggggagtcc tagcgtggca caagatttta accctaagag ttttgtgaat 840
59 gtttgtgatt ttaaagattt tgatgaagcg attgatcatg tgcgatactt gcacacgcac 900
60 ccaaacgctt atttagacat gctttatgaa aaccctttaa acacccttga tgggaaagct 960
61 tactttttacc aaaatttgag ttttaaaaaa atcctagatt tttttaaaac gatttttagaa 1020
62 aacgacacga tttatcacga taaccctttt attttttatc gtgatttgaa tgagccgtta 1080
63 atatctattg atgatgattt gaggggttaat tatgatgatt tgaggggttaa ttatgatgat 1140
64 ttgaggggtta attatgatga tttgaggggtt aattatgatg atttgaggggt taattatgat 1200
65 gatttgagggg ttaattatga tgatttgagg gttaattatg atgatttgag ggttaattat 1260
66 gatgatttga ggggttaatta tgatgatttg aggggttaatt atgatgattt gaggggttaat 1320
67 tatgagcggc tcttacaaaa cgcctcgcct ttattagaac tctctcaaaa caccactttt 1380
68 aaaatctatc gcaaagctta tcaaaaatcc ttacctttgt tgcgtgcggc gagaaagttg 1440
69 attaaaaaat tgggtttgta a                                     1461

```

72 &lt;210&gt; SEQ ID NO: 2

73 &lt;211&gt; LENGTH: 486

74 &lt;212&gt; TYPE: PRT

75 &lt;213&gt; ORGANISM: Helicobacter pylori

77 &lt;220&gt; FEATURE:

78 &lt;223&gt; OTHER INFORMATION: Helicobacter pylori strain 1182 FutB

79 alpha-1,3/4-fucosyltransferase

81 &lt;400&gt; SEQUENCE: 2

```

82 Met Phe Gln Pro Leu Leu Asp Ala Tyr Ile Glu Ser Ala Ser Ile Glu
83   1           5           10           15
85 Lys Ile Thr Ser Lys Ser Pro Pro Pro Leu Lys Ile Ala Val Ala Asn
86           20           25           30
88 Trp Trp Gly Asp Glu Glu Val Glu Glu Phe Lys Lys Asn Ile Leu Tyr
89           35           40           45
91 Phe Ile Leu Ser Gln His Tyr Thr Ile Thr Leu His Gln Asn Pro Asn
92           50           55           60
94 Glu Pro Ser Asp Leu Val Phe Gly Ser Pro Ile Gly Ser Ala Arg Lys
95   65           70           75           80
97 Ile Leu Ser Tyr Gln Asn Ala Lys Arg Val Phe Tyr Thr Gly Glu Asn
98           85           90           95
100 Glu Ser Pro Asn Phe Asn Leu Phe Asp Tyr Ala Ile Gly Phe Asp Glu
101           100          105          110
103 Leu Asp Phe Arg Asp Arg Tyr Leu Arg Met Pro Leu Tyr Tyr Asp Arg
104           115          120          125
106 Leu His His Lys Ala Glu Ser Val Asn Asp Thr Thr Ser Pro Tyr Lys
107           130          135          140
109 Leu Lys Pro Asp Ser Leu Tyr Ala Leu Lys Lys Pro Ser His His Phe
110 145           150          155          160
112 Lys Glu Asn His Pro Asn Leu Cys Ala Val Val Asn Asn Glu Ser Asp
113           165          170          175
115 Pro Leu Lys Arg Gly Phe Ala Ser Phe Val Ala Ser Asn Pro Asn Ala
116           180          185          190
118 Pro Lys Arg Asn Ala Phe Tyr Asp Val Leu Asn Ser Ile Glu Pro Val
119           195          200          205
121 Ile Gly Gly Gly Ser Val Lys Asn Thr Leu Gly Tyr Asn Ile Lys Asn
122           210          215          220
124 Lys Ser Glu Phe Leu Ser Gln Tyr Lys Phe Asn Leu Cys Phe Glu Asn

```

## RAW SEQUENCE LISTING

DATE: 04/14/2006

PATENT APPLICATION: US/10/521,138

TIME: 11:20:54

Input Set : A:\-159-2.APP

Output Set: N:\CRF4\04142006\J521138.raw

```

125 225          230          235          240
127 Ser Gln Gly Tyr Gly Tyr Val Thr Glu Lys Ile Ile Asp Ala Tyr Phe
128          245          250          255
130 Ser His Thr Ile Pro Ile Tyr Trp Gly Ser Pro Ser Val Ala Gln Asp
131          260          265          270
133 Phe Asn Pro Lys Ser Phe Val Asn Val Cys Asp Phe Lys Asp Phe Asp
134          275          280          285
136 Glu Ala Ile Asp His Val Arg Tyr Leu His Thr His Pro Asn Ala Tyr
137          290          295          300
139 Leu Asp Met Leu Tyr Glu Asn Pro Leu Asn Thr Leu Asp Gly Lys Ala
140 305          310          315          320
142 Tyr Phe Tyr Gln Asn Leu Ser Phe Lys Lys Ile Leu Asp Phe Phe Lys
143          325          330          335
145 Thr Ile Leu Glu Asn Asp Thr Ile Tyr His Asp Asn Pro Phe Ile Phe
146          340          345          350
148 Tyr Arg Asp Leu Asn Glu Pro Leu Ile Ser Ile Asp Asp Asp Leu Arg
149          355          360          365
151 Val Asn Tyr Asp Asp Leu Arg Val Asn Tyr Asp Asp Leu Arg Val Asn
152          370          375          380
154 Tyr Asp Asp Leu Arg Val Asn Tyr Asp Asp Leu Arg Val Asn Tyr Asp
155 385          390          395          400
157 Asp Leu Arg Val Asn Tyr Asp Asp Leu Arg Val Asn Tyr Asp Asp Leu
158          405          410          415
160 Arg Val Asn Tyr Asp Asp Leu Arg Val Asn Tyr Asp Asp Leu Arg Val
161          420          425          430
163 Asn Tyr Asp Asp Leu Arg Val Asn Tyr Glu Arg Leu Leu Gln Asn Ala
164          435          440          445
166 Ser Pro Leu Leu Glu Leu Ser Gln Asn Thr Thr Phe Lys Ile Tyr Arg
167          450          455          460
169 Lys Ala Tyr Gln Lys Ser Leu Pro Leu Leu Arg Ala Ala Arg Lys Leu
170 465          470          475          480
172 Ile Lys Lys Leu Gly Leu
173          485
176 <210> SEQ ID NO: 3
177 <211> LENGTH: 1299
178 <212> TYPE: DNA
179 <213> ORGANISM: Helicobacter pylori
181 <220> FEATURE:
182 <223> OTHER INFORMATION: Helicobacter pylori strain 1111 FutA
183      alpha-1,3/4-fucosyltransferase
185 <400> SEQUENCE: 3
186 atgttccaac ccctattaga tgcctttata gaaagcgctc cattgaaaaa atggcctcta 60
187 aatctccccc ccctaaaaat cgctgtggcg aattggtggg gagatgaaga aattaaaaaa 120
188 tttaaaaaga gcgttcttta tttatccta agccagcatt acacaatcac ttacaccga 180
189 aaccctgata aacctgcgga catcgtcttt ggtaaccccc ttggatcagc cagaaaaatc 240
190 ttatcctatc aaaacgcaaa aagggtgttt tacaccggtg aaaatgaagt ccctaacttc 300
191 aacctctttg attacgccat aggctttgat gaattggact ttagagatcg ttatttgaga 360
192 atgcctttgt attatgccta tttgcattat aaagccgagc ttgttaatga caccacttcg 420
193 ccttataaac tccaacctga cagcctttat gctttaaaaa aacctccca tcatttttaa 480

```

## RAW SEQUENCE LISTING

DATE: 04/14/2006

PATENT APPLICATION: US/10/521,138

TIME: 11:20:55

Input Set : A:\-159-2.APP

Output Set: N:\CRF4\04142006\J521138.raw

```

194 gaaaaccacc ccaatttggtg cgcagtagtg aataatgaga gtgataccttt gaaaagaggg 540
195 ttgtcgagct ttgtcgcaag caaccctaac gtccttagaa ggaacgcttt ttatgaggct 600
196 ttaaactgta ttgagccagt tgctggggga gggagcgtga aaaacacttt aggctataat 660
197 gtcaaaaaca agagcgagtt tttaagccaa tacaaattca atctgtgttt tgaaaacact 720
198 caaggctatg gctatgtaac tgaaaagatc attgacgctt atttcagcca taccattcct 780
199 atttattggg ggagtcaccag cgtggcgaaa gattttaacc ctaagagttt tgtgaatgtc 840
200 catgatttca acaactttga tgaagcgatt gactatatca gatacttgca cagcaccca 900
201 aacgcttatt tagacatgca ctatgaaaac cttttaaaca ctattgatgg gaaagcttac 960
202 ttttaccaaa atttgagttt taaaaaaatc ctagattttt ttaaaacgat ttagaaaaac 1020
203 gacacgatct atcacgataa ccctttcatt ttctatcgtg atttgaatga gccttcagta 1080
204 tctattgatg gtttgagggt taattatgat gatttgaggg ttaattatga tgatttgagg 1140
205 gttaattatg atgatttgag ggttaattat gagcgccttt tacaaaacgc ctgccttta 1200
206 ttagaactct ctcaaacac cacttttaaa atctatcgca aagcttatca aaaatccttg 1260
207 cctttgttgc gtgccataag gagatggggt aaaaagtaa 1299

```

210 &lt;210&gt; SEQ ID NO: 4

211 &lt;211&gt; LENGTH: 432

212 &lt;212&gt; TYPE: PRT

213 &lt;213&gt; ORGANISM: Helicobacter pylori

215 &lt;220&gt; FEATURE:

216 &lt;223&gt; OTHER INFORMATION: Helicobacter pylori strain 1111 FutA

217 alpha-1,3/4-fucosyltransferase

219 &lt;400&gt; SEQUENCE: 4

```

220 Met Phe Gln Pro Leu Leu Asp Ala Phe Ile Glu Ser Ala Pro Leu Lys
221   1           5           10           15
223 Lys Trp Pro Leu Asn Leu Pro Pro Leu Lys Ile Ala Val Ala Asn Trp
224           20           25           30
226 Trp Gly Asp Glu Glu Ile Lys Lys Phe Lys Lys Ser Val Leu Tyr Phe
227           35           40           45
229 Ile Leu Ser Gln His Tyr Thr Ile Thr Leu His Arg Asn Pro Asp Lys
230           50           55           60
232 Pro Ala Asp Ile Val Phe Gly Asn Pro Leu Gly Ser Ala Arg Lys Ile
233           65           70           75           80
235 Leu Ser Tyr Gln Asn Ala Lys Arg Val Phe Tyr Thr Gly Glu Asn Glu
236           85           90           95
238 Val Pro Asn Phe Asn Leu Phe Asp Tyr Ala Ile Gly Phe Asp Glu Leu
239           100          105          110
241 Asp Phe Arg Asp Arg Tyr Leu Arg Met Pro Leu Tyr Tyr Ala Tyr Leu
242           115          120          125
244 His Tyr Lys Ala Glu Leu Val Asn Asp Thr Thr Ser Pro Tyr Lys Leu
245           130          135          140
247 Gln Pro Asp Ser Leu Tyr Ala Leu Lys Lys Pro Ser His His Phe Lys
248           145          150          155          160
250 Glu Asn His Pro Asn Leu Cys Ala Val Val Asn Asn Glu Ser Asp Pro
251           165          170          175
253 Leu Lys Arg Gly Phe Ala Ser Phe Val Ala Ser Asn Pro Asn Ala Pro
254           180          185          190
256 Arg Arg Asn Ala Phe Tyr Glu Ala Leu Asn Ala Ile Glu Pro Val Ala
257           195          200          205
259 Gly Gly Gly Ser Val Lys Asn Thr Leu Gly Tyr Asn Val Lys Asn Lys

```

## RAW SEQUENCE LISTING

DATE: 04/14/2006

PATENT APPLICATION: US/10/521,138

TIME: 11:20:55

Input Set : A:\-159-2.APP

Output Set: N:\CRF4\04142006\J521138.raw

```

260      210      215      220
262 Ser Glu Phe Leu Ser Gln Tyr Lys Phe Asn Leu Cys Phe Glu Asn Thr
263 225      230      235      240
265 Gln Gly Tyr Gly Tyr Val Thr Glu Lys Ile Ile Asp Ala Tyr Phe Ser
266      245      250      255
268 His Thr Ile Pro Ile Tyr Trp Gly Ser Pro Ser Val Ala Lys Asp Phe
269      260      265      270
271 Asn Pro Lys Ser Phe Val Asn Val His Asp Phe Asn Asn Phe Asp Glu
272      275      280      285
274 Ala Ile Asp Tyr Ile Arg Tyr Leu His Thr His Pro Asn Ala Tyr Leu
275      290      295      300
277 Asp Met His Tyr Glu Asn Pro Leu Asn Thr Ile Asp Gly Lys Ala Tyr
278 305      310      315      320
280 Phe Tyr Gln Asn Leu Ser Phe Lys Lys Ile Leu Asp Phe Phe Lys Thr
281      325      330      335
283 Ile Leu Glu Asn Asp Thr Ile Tyr His Asp Asn Pro Phe Ile Phe Tyr
284      340      345      350
286 Arg Asp Leu Asn Glu Pro Ser Val Ser Ile Asp Gly Leu Arg Val Asn
287      355      360      365
289 Tyr Asp Asp Leu Arg Val Asn Tyr Asp Asp Leu Arg Val Asn Tyr Asp
290      370      375      380
292 Asp Leu Arg Val Asn Tyr Glu Arg Leu Leu Gln Asn Ala Ser Pro Leu
293 385      390      395      400
295 Leu Glu Leu Ser Gln Asn Thr Thr Phe Lys Ile Tyr Arg Lys Ala Tyr
296      405      410      415
298 Gln Lys Ser Leu Pro Leu Leu Arg Ala Ile Arg Arg Trp Val Lys Lys
299      420      425      430
302 <210> SEQ ID NO: 5
303 <211> LENGTH: 1458
304 <212> TYPE: DNA
305 <213> ORGANISM: Helicobacter pylori
307 <220> FEATURE:
308 <223> OTHER INFORMATION: Helicobacter pylori strain 1218 FutB
309      alpha-1,3/4-fucosyltransferase
311 <400> SEQUENCE: 5
312 atgttccaac ccctattaga cgcttatata gaaagcgctt ccattgaaaa aattacctct 60
313 aaatctcccc cccccctaaa aatcgctgtg gcgaattggg ggggagatga agagggttgaa 120
314 gaatttaaaa agaacattct ttattttatt ctgagtcagc attacacaat caccctccac 180
315 caaaacccca acgaaccctc cgatctcgtc tttggcagtc ctattggatc agccagaaaa 240
316 atctttatcct atcaaaacgc aaaaagagtg ttttacaccg gtgaaaacga atcgccctaat 300
317 ttcaacctct ttgattacgc cataggcttt gatgaattgg attttagaga tcgtttattta 360
318 agaatgcctt tatattatga tagactacac cataaagccg agagcgtgaa tgacaccact 420
319 tcgccttaca aactcaaacc tgacagcctt tatgctttta aaaaaccctc ccatcatttt 480
320 aaagaaaacc accccaattt atgcgagta gtgaacaatg agagcgatcc tttgaaaaga 540
321 gggtttgcca gttttgtagc gagcaaccct aacgctccta aaaggaatgc tttctatgac 600
322 gcttttaatt ctatagagcc agttattggg ggaggaggcg tgaaaaacac tttaggctat 660
323 aacattaaaa acaagagcga gtttttaagc caatacaaat tcaatctgtg ttttgaaaac 720
324 tcacaaggct atggctatgt aactgaaaaa atcattgacg cttacttttag ccataccatt 780
325 cctattttatt gggggagtcc tagcgtggca caagatttta accctaagag ttttgtgaat 840

```

VERIFICATION SUMMARY

DATE: 04/14/2006

PATENT APPLICATION: US/10/521,138

TIME: 11:20:56

Input Set : A:\-159-2.APP

Output Set: N:\CRF4\04142006\J521138.raw

L:16 M:270 C: Current Application Number differs, Replaced Current Application Number

L:17 M:271 C: Current Filing Date differs, Replaced Current Filing Date